

Wild Dogs (*Canis rutilans*) from Sumatra, a Javan Adjutant (*Leptoptilus javanicus*) from Java, received in exchange; a Wapiti Deer (*Cervus canadensis*), an Axis Deer (*Cervus axis*), born in the Gardens; three Siamese Pheasants (*Euplocamus praelatus*), two Horned Tragopans (*Cerornis satyra*), two Peacock Pheasants (*Polyplectron chinquis*), four Mandarin Ducks (*Aix galericulata*), four Variegated Sheldrakes (*Tadorna variegata*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

KEPLER'S NOVA OF 1604.—The vicinity of this object is now favourably situate for observation in the evenings, and it is well worth while to keep a close watch upon one or two small stars near the position deduced for Kepler's object by Prof. Schönfeld from the observations of David Fabricius, which he considered preferable to those of Kepler and his pupils, given in his celebrated work, "De Stella nova in pede Serpentarii," more especially upon a star of the twelfth magnitude, or fainter, observed by Prof. Winnecke in 1875, which is close upon the place of a star of the tenth magnitude inserted on Chacornac's chart, but not afterwards found of this degree of brightness, and which is still more significant, almost exactly in the position of Kepler's object assigned by the observations of Fabricius. The most convenient reference-star in this neighbourhood is one meridionally observed by Argelander, No. 16872 of Oeltzen's Catalogue, a bright ninth magnitude, the position of which for the beginning of the present year is in R.A. 17h. 23m. 52^s, N.P.D. 111° 23' 22"; Schönfeld's place of Nova 1604 for the same epoch is in R.A. 17h. 23m. 26^s, N.P.D. 111° 22' 32"; Winnecke's star precedes Argelander's 33^s, in 2° 7' less N.P.D. There is a somewhat brighter star preceding Argelander's 18^s, with 1° 6' greater N.P.D., which, after several years' observation, has not exhibited any sensible fluctuation of magnitude. Attention should be chiefly directed to Winnecke's object, and it would be desirable to know its present magnitude, which some reader of this column may have the opportunity of putting upon record; we would, however, suggest its frequent observation.

There is no reason to suppose, notwithstanding the name of "temporary stars" which has been attached to them, that either Tycho Brahe's famous star of 1572, Kepler's of 1604, or the less conspicuous star discovered by Anthonim in 1670, have died out; on the contrary, in all three cases there are now small stars close upon the best positions which we can assign to the objects of those years, in which some fluctuations of brightness have been remarked after very careful observation.

WESTPHAL'S COMET (1852 IV).—In Mr. Chamber's useful manual of astronomy there is an oversight with respect to the orbit of the comet discovered by Westphal at Göttingen in June, 1852, the elliptic character of which was first made apparent by the computations of Mr. Marth towards the end of the same year. Elements derived from the earlier calculations are given in place of the definitive orbit deduced by Dr. Axel-Möller or the similar very completely-investigated orbit by the discoverer; hence the comet is credited with a period of revolution which is certainly ten years in excess of that belonging to the ellipse in which it was moving during its appearance in 1852. Dr. Axel-Möller's orbit is as follows:—

Perihelion passage, 1852, October 12th 1852 G.M.T.

Longitude of perihelion ...	43° 14' 8"	Mean equinox,
ascending node	346° 9' 49"	1852°
Inclination ...	40° 54' 28"	
Angle of eccentricity ...	66° 42' 8.36	
Log. semi-axis major ...	1.1855845	
Motion—direct.		

With these elements we find:—

Semi-axis major ...	15'3315
" minor ...	6'0637
Excentricity ...	0'9184625
Aphelion distance ...	29'4129
Perihelion distance ...	1'2501
Revolution ...	60'031 years

It is easy to see by what action the comet has been at some past time in all probability fixed in this orbit till similar perturbation recurs. In a true anomaly of 126° 30' after perihelion or in ecliptical longitude 168° 52', the comet is distant

from the orbit of Jupiter only 0'36 of the earth's mean distance from the sun, and so close an approach of the two bodies would almost certainly result in the impression upon the comet of an orbit, materially differing from that in which it moved previously; this we know has occurred in several instances since the motions of comets have been rigorously investigated, a notable case being that of Brorsen's comet, which is now moving in an orbit into which it was thrown by its encounter with Jupiter in May, 1842.

GEOGRAPHICAL NOTES

IN yesterday's *Times* is a letter from Mr. Thorndike Rice, giving details of the programme of the expedition to Central America, under the leadership of M. Charnay, for the exploration of the ancient monuments there, and to which we referred some time ago. Casts will be taken of all important bas-reliefs and inscriptions, part of which will be deposited in the Smithsonian Institution, and part sent to Paris. Details of the work of the expedition will be published from time to time in the *North American Review*.

CONSIDERABLE attention is still attracted in Australia to the supposed existence in recent years of a survivor of Leichhardt's great exploring expedition, which disappeared in 1848. Numerous lengthy communications have been published by the Colonial press, which tend to confirm the belief that an aged European, not improbably Classen, as we have before mentioned, was living with the blacks near the Queensland border until some four years ago. A man has also come forward at Sydney and made a curious statement to the effect that he was a sailor on board a steamer which was sent by the South Australian Government in 1867 to take cargo to the Roper River, Gulf of Carpentaria, and that on landing some ten miles to the south of the mouth of that river he met natives who told him that three days journey up the river there was an old white man with a very long beard. The position mentioned would, it is thought, be very near the Elsey, where it has been before suggested that something might be found out about the fate of Leichhardt's party. It is to be regretted that the different persons who have contributed items of information did not come forward sooner with their contributions, however small, towards the solution of this mystery, as it might have been cleared up ere this.

THE s.s. *Eira*, recently launched, left Peterhead on Saturday morning for the Arctic regions on a voyage of discovery. She has a crew of some twenty-five, and carries a photographer, the same who accompanied Capt. Nares, and a doctor. The steamer has been coaled and provisioned for two years, but her return is expected before that time.

THE Ontario correspondent of the *Colonies and India* states that the construction of the long-talked-of railway across the island of Newfoundland has at length been decided upon; it will be 350 miles long, and will be of great benefit to the island.

IN his report on the department of maps, charts, &c., at the British Museum, Mr. Major notes the undermentioned interesting additions during the past year:—A large English chart on parchment of the coasts of Brazil and Africa of the early date of 1647, bearing the legend, "made by Nicholas Comberford, dwelling neare to the West end of the Schoole House, at the XX signe of the Plat in Radcliffe, anno 1647." Also two illuminated and gilt MS. maps on parchment, the one of the coasts of Florida, New Spain, and Africa (1688), and the other of the West Indies (1698). These are by Jose da Costa Miranda. Another valuable acquisition is an important plan of Paris in seventy-two sheets, constructed by Varniquet, and finished in 1791, after thirty years' labour.

THE new number of the Belgian Geographical Society's *Bulletin* opens with a paper on the geography of Lake Tanganyika, which was prepared by Lieut.-Col. Adan for the committee of the International African Association; it is illustrated by an interesting reproduction on one sheet of various maps, exhibiting the views of cartographers on the shape of the lake. The other papers are by Dr. Litton Forbes on the Island of Rotumah, and by M. A. J. Wauters on the African elephant.

SIR JOHN LUBBOCK ON THE HABITS OF ANTS

IN a further contribution of his observations towards elucidating the economy and habits of these insects, laid before the last meeting of the Linnean Society (June 17), Sir John commenced

by relating his fresh experiments on their powers of communication. Among others a dead blue-bottle fly was pinned down, and after vain efforts at removal the selected ant lied home, and emerged with friends who slowly, and evidently incredulously, followed their guide. The latter starting off at a great pace distanced them, and they returned, again, however, to be informed, come out and at length be coaxed to the prey. In the several experiments with different species of ants and under varied circumstances, these seem to indicate the possession by ants of something approaching language. It is impossible to doubt that the friends were brought out by the first ant, and as she returned empty handed to the nest the others cannot have been induced to follow merely by observing her proceedings. Hence the conclusion that they possess the power of requesting their friends to come and help them. For other experiments testing the recognition of relations, although the old ants had absolutely never seen the young ones until the moment, some days after arriving at maturity, they were introduced into the nest, yet in all cases they were undoubtedly recognised as belonging to the community. It would seem, therefore, to be established that the recognition of ants is not personal and individual, and that their harmony is not due to the fact that each ant is acquainted with every other member of the community. It would further appear from the fact that they recognise their friends even when intoxicated, and that they know the young born in their own nest, even when they have been brought out of the chrysalis by strangers, indicating, therefore, that the recognition is not effected by means of any sign or password. With regard to workers breeding, the additional evidence tends to confirm previously-advanced views, that when workers lay eggs males are always the issue of these. Without entering into details of instances it may broadly be affirmed that in the queenless nests males have been produced, and in not a single case has a worker-laid egg which have produced a female, either a queen or a worker. On the contrary, in nests possessing a queen, workers have been abundantly produced. The inference to these curious physiological facts leads to the presumption that, as in the case of bees, so also in ants, some special food is required to develop the female embryo into a queen. In Sir John's nests, while from accidents and other causes many ants are lost during the summer months, in winter, nevertheless, there are few deaths. As to the age attained, specimens of *Formica fusca* and *F. sanguinea*, still lively, are now four and others five years old at least. The behaviour to strange queens often results in their being ruthlessly killed; yet as communities are known to have existed for years, queens must occasionally have been adopted. With the view of trying how far dislike and passion might be assuaged by a formal temporary acquaintance a queen of *F. fusca* was introduced into a queenless nest, but protected by a wire cage, and after some days the latter removed, but the queen was at once attacked. Mr. McCook, nevertheless, relates an instance of a fertile queen of *Cremastogaster lineolata* having been adopted by a colony of the same species.

Such difference in conduct, Sir John suggests, may be due to his own ants having been living in a republic; for it is affirmed that bees long without a queen are strongly averse to adopt or accept another. Furthermore, if a few ants from a strange nest are put along with a queen they do not attack her, and if other ants are by degrees added the throne is ultimately secured. In pursuance of experiments to test the sense of direction, some ants were trained to go for their food over a wooden bridge made up of segments. Having got accustomed to the way, afterwards when an ant was in the act of crossing, a segment was suddenly reversed in direction, evidently to the ant's discomfiture; she then either turned round, or, after traversing the bridge, would return. When, however, similar pieces of wood were placed between nest and food, and the ant at the middle piece, those at the ends being transposed, the ant was not disconcerted. In other instances a circular paper disk was placed on a paper bridge, and when the ant was on the disk this was revolved, but the ant turned round with the paper. A hat-box with holes of entrance and exit pierced at opposite sides was planted across the line to the food; when the ant had entered and the box turned round, the ant likewise wheeled about, evidently retaining her sense of direction. Again, with the insect en route, when the disk or box with the ant within was merely shifted to the opposite side of the food without being turned round, the ant did not turn round, but continued in what ought to have been the direction to the food, and evidently was surprised at the result on arrival at the spot where the food had

previously been. To ascertain whether ants make sounds audible to one another, the use of the telephone was resorted to, but the results were negative. These experiments may not be conclusive, for the plate of the telephone may be too stiff to be set in vibration by any sounds which the ants produced. As opposed to the opinion expressed by M. Dewitz, Sir J. Lubbock regards the ancestral ant as having been aculeate, and that the rudimentary condition of the sting in *Formica* is due to atrophy, perhaps attributable to disuse. A ground plan of the nest of *Lasius niger* is now given by Sir John, which exhibits an intricate, narrow, and winding entrance-passage; the main nest cavity is further supported by pillars, and here and there by islands; protected recesses obtain, evidently strategical retreats in times of danger. Studying the relations and treatment of the aphides, or plant-lice of the ants, Sir John clearly demonstrates that not only are the aphides kept and protected in the ants' nests, but the eggs of *Aphis* laid outside on the leaf-stalks of its food-plant in October, when exposed to risks of weather, are carefully brought by the ants into their nests, and afterwards tended by them during the long winter months until March, when the young ones are again brought out and placed on the young vegetable shoots. This proves prudential motives, for though our native ants may not lay up such great supplies of winter stores of food as do some of those found abroad, they thus nevertheless take the means to enable them to procure food during the following summer. The fact of European ants not generally laying up abundant stores may be due to the nature of their food. Insects and small animals form portions of their food, and these cannot always be kept fresh. They may also not have learnt the art of building vessels for their honey, probably because their young are not kept in cells like those of the honey bee, and their pupæ do not construct cocoons like those of the humble bee. Relatively to their size our English ants nevertheless store proportionally; for if the little brown garden ant be watched milking their aphides, a marked abdominal distension is observable. The paper concludes by the history and technical description of a new species of Australian honey ant. This corroborates Westmael's strange account of the Mexican species; certain individual ants being told off as receptacles for food, in short they become literally animated honey pots.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THE committee of management of the Royal Agricultural College, Cirencester, have just established two scholarships of 25*l.* and 10*l.* respectively, to be open to all students of the college, and to be awarded three times every year in accordance with the results of the sessional examinations. The first award will take place after the Christmas examination of the present year. The vellum certificates and book prizes, and the gold medals, will be continued as heretofore.

THE first session of the representative Conseil Supérieure de l'Instruction Publique of France was closed on June 17, by an address pronounced by M. Jules Ferry. The result of the deliberations has been to raise the standard of *Baccalaureat*, the first step in French classical honours; the time allotted to Greek and Latin in the course of studies has been curtailed at the expense of themes and versification, and allotted either to science or to living languages. The work of the next session will be to organise the scientific instruction. Sharp discussions are expected between the delegates who wish to organise a special course of instruction for sciences, and those who stick to the old scheme of making the preparation for the Government schools a supplement to classical instruction.

SCIENTIFIC SERIALS

Annalen der Physik und Chemie, No. 5.—On tones generated by a limited number of impulses, by W. Kohlrausch.—On torsion, by E. Warburg.—On stationary vibrations of a heavy fluid, by G. Kirchhoff.—On the propagation of electricity by current water, and allied phenomena (continued), by E. Dorn.—On the new relation discovered by Dr. Kerr between light and electricity, by W. C. Röntgen.—On some new researches on the mean length of path of molecules, by R. Clausius.—Researches on heat-conduction in liquids, by H. F. Weber.—Researches on the height of the atmosphere and the constitution of gaseous celestial bodies (continued), by A. Ritter.—On ultra-violet rays (con-